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Transmission of *Trypanosoma congolense* in Cattle under Field Conditions in the Absence of Tsetse Flies

BY

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THE epidemiology of cattle trypanosomiasis in Africa has led authors to recommend that a study of trypanosomiasis in areas where *Glossina* species are absent should be undertaken (Buxton, 1948).

In the field, writers have frequently drawn conclusions on the evidence available, that trypanosomiasis, especially *Trypanosoma congolense* in cattle, is spread to healthy cattle by biting flies in areas where *Glossina* species are not incriminated. During the last 20 years the Annual Reports of the Uganda, Kenya and Tanganyika Veterinary Departments make frequent references to the occurrence of trypanosomiasis in fly-free areas in the field. There has been no definite proof that infections were occurring in the fly-free areas as the cattle may already have been infected when introduced into the area, or have had undetected contact with tsetse flies, or even become infected through inoculations with contaminated instruments during control measures against other diseases.

The experiments to be described were carried out in such an area under local conditions of animal husbandry to demonstrate whether the disease produced by *T. congolense* in cattle can be, and is, transmitted under these conditions in the absence of tsetse flies, and to obtain data as precise as possible from a field experiment.

Wenyon (1926) and Hornby (1949) state that all pathogenic trypanosomes which are transmitted by tsetse flies have been shown by various observers to be capable of mechanical transmission. On experimental evidence Poulton (1934) concluded that *T. congolense* may be transmitted to healthy cattle from infected ones by *Stomoxys* and *Tabanids*.

Cattle

The 35 cattle for use in the experiment were purchased by the Uganda Veterinary Department in the Eastern Province of Uganda, and collected at the Animal Health Research Centre, Entebbe. The cattle were bullocks of the small East African Zebu type, 12 to 18 months old. This type of cattle was chosen because it is very different from the native long-horned Ankole cattle. Thus it was easier to ensure effective segregation from the local cattle. They were in very poor condition when purchased, the average weight was approximately

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150 lb. All showed enlarged precrural lymphatic glands, which suggested that they had recovered from East Coast fever.

At Entebbe the cattle were kept on a paddock with a moderate grazing of *Paspalum notatum*. They received a supplementary ration of half a pound each daily of cotton seed cake, and had available compound mineral licks. All the cattle were treated once for internal parasites with phenothiazine and were vaccinated with blackquarter vaccine.

Between December 13th and 31st, 1952, the cattle were removed by lorry from Entebbe to Mbarara, a distance of 203 miles. The lorry used was made fly-proof by covering the superstructure with mosquito gauze. Cattle were moved by night only, with no stops on the way, as the route passed through a narrow corridor between two tsetse-fly areas. The movement was completed in four journeys.

Experimental Site

The experiment was sited in a tsetse-free area where trypanosomiasis is sufficiently common to warrant "block treatment" of cattle. The occurrence of biting flies is similar to that in other parts of Uganda where trypanosomiasis is common, or frequent, in the absence of tsetse flies. By arrangement with the local authorities the local native cattle were kept at a distance, and sufficient land was made available for the effective segregation of the experimental herds.

Koga Swamp, 16 miles from Mbarara, Western Uganda, was selected for the following reasons :—

(*a*) *Freedom from Tsetse Flies.*—The nearest area to the experimental site containing tsetse flies is some 20 miles directly across country. This is a narrow *G. morsitans* salient which is partially cleared. There are fly pickets stationed on all the routes from this salient which examine all traffic coming out of the fly area for tsetse flies. There is an area containing a few *G. pallidipes* some 40 miles away. This area has also been almost completely cleared. There are no roads from these fly areas leading directly past the experimental site.

(*b*) *Adequate Watering Facilities.*—The swamp contains a river which is flowing all the year round, and as this runs approximately straight through the swamp area it was possible to prepare separate watering places for the cattle from each kraal.

(*c*) *Fair Grazing.*—The country is open savannah with few trees, while the swamp contains a fair growth of grass, mainly *Themeda triandra*, which was adequate all the year round for the number of cattle used in the experiment.

(*d*) *Freedom from Contact with Native Herds of Cattle.*—The nearest native cattle were not kraaled within a mile of the swamp, and through the co-operation of local chiefs cattle owners kept their animals clear of the area for grazing and watering.

(*e*) *Biting Flies.*—Before Koga was approved as a site for the experiment the area was surveyed on foot by an entomologist and fly boys, who confirmed that it was free of tsetse flies. The biting flies most common in the area are *Stomoxys* sp. During the wet seasons *Haematopota* sp., *Tabanus* sp. and occasional *Chrysops* sp. are found. Mosquitoes and midges are fairly abundant. It was thought that the dampness of the soil, which is of a poorly drained light sandy loam type, would be conducive to the breeding of flies.

Trypanosome Strains

Strains of *T. congolense* for use in the experiment were collected from areas away from the experimental area as it was thought that local strains might have been affected by "block treatment" of cattle in the area with antrycide.

T. congolense (Strain 43) used for the first part of the experiment was isolated from cattle at Mariakani, Kenya, and has been maintained in mice at Kabete Veterinary Laboratories for at least 10 months. On inoculation into cattle it produced a parasitaemia within eight days, thus appearing to be highly infective. It will be seen from the results that the pathogenicity for cattle was, however, slight.

T. congolense (Strain Yatta) was used in the second part. This strain had been recently isolated from cattle in the field at Yatta (Kenya) and passaged twice through mice. The disease produced by this strain after inoculation was milder than with Strain 43.

Method

The area and cattle were under constant supervision of a European by day and night during the whole course of the experiment. The cattle were collected at the experimental site by January 1st, 1953, and were then divided, at random, into the kraals ; 10 cattle in each of Kraals A and B and 14 in Kraal C. The cattle were confined to their kraals during the night, from 7 p.m. until 7 a.m. and were grazed in their respective grazing areas during the day, supervised by herd boys. They were taken to the water holes at midday and in the evening. The cattle in Kraals A and B were confined to their kraal every day for one hour after the sun was up and for one hour in the evening before sunset, at times when the biting flies appeared to be most active. During these periods the cattle in Kraal B were driven round inside the kraal, harassed by a herd boy and kept on the move in order to increase the chances of interrupted feeding by the biting flies. Kraal A cattle were allowed to stand. The cattle in Kraal C acted as area controls during the experiment and were grazed around the perimeter of the experimental area.

Each kraal consisted of a herd-boy's hut and a lion-proof enclosure for the cattle built of thorn bush, about 12 feet in diameter and 10 feet high with a cattle race leading from it. The grazing areas were clearly defined by natural objects and were so planned that the cattle of each kraal remained at least 300 yards apart, by leaving a broad channel, 300 yards wide, between each area which was forbidden to all cattle.

The ears of all cattle were dressed every third day with tick grease as a measure against purulent otitis, which disease occurs in the area and is thought to be primarily caused by the bites of ticks.

The temperature of the cattle was taken each day at 7 a.m. and at 5.30 p.m.

During the 30 days that the cattle had been held at Entebbe, daily examinations of thick blood smears and a weekly examination of gland smears had been carried

out. At Koga, every morning before the cattle were released from the kraals thick blood smears were taken from their ears. A clean pin was used for each animal. From all cattle prescapular gland smears were taken once every seven days. The smears were dried in the air, stained with Giemsa stain, and about 200 fields were examined under 1/12 oil immersion.

Each month about 1 c.c. of blood was taken from each animal and inoculated in 1 per cent. saline into white mice by the intraperitoneal route. These examinations were continued for eight weeks during which time no trypanosomes were seen on the slides or isolated in the mice.

On February 11th, 1953, two cattle were selected from each of Kraals A and B and inoculated, subcutaneously, with 5 c.c. citrated blood from mice infected with *T. congolense*, Strain 43. The inoculated cattle were all positive within eight days.

The examination of all cattle was now made by thick blood smears on every alternate day and gland smears weekly.

Results

(*a*) *Cattle*

The cattle inoculated from mice with *T. congolense*, Strain 43, after an incubation period of eight days, became positive. Parasites were counted and the numbers compared with those of leucocytes stained in thick blood smears. The temperatures of the inoculated cattle became irregular, generally with a greater variation between morning and evening temperatures than in the contact cattle. They were strongly positive for eight weeks, after which the number of parasites in the blood became fewer, until after 12 weeks they were only showing scarce parasites at infrequent intervals. Trypanosomes were only seen in gland smears very occasionally throughout the 12 weeks that the blood smears were positive. Only one of the four inoculated cattle died of trypanosomiasis, after four months' infection. Clinically, the inoculated cattle became thin, developed staring coats, and showed geophagia. Compared with the cattle with which they were in contact all appeared to have increased thirst for water. Haemoglobin percentages fell from between 70 and 80 per cent. (Tallquist scale) to between 40 and 60 per cent. during the first four months after inoculation and then began to recover, except in the animal which died of trypanosomiasis. The recovering animals improved clinically as they became negative.

(*b*) *Transmission*

In Kraal A two animals became infected ; the first after 14 days' contact with the two inoculated cattle and the second after 211 days. In Kraal B, three animals became infected ; after 61, 156 and 183 days' contact. The possibility was considered that other in-contact animals were infected and suffering sub-clinical infections. Shock treatment was tried on all these animals using, at different times, Adrenalin B.P. 1 in 1,000, 5 c.c. intravenously ; Insulin, 40 units per c.c., 200 units subcutaneously followed after four hours by 100 units intravenously ; Histamine, 6 mg. subcutaneously ; and skimmed milk, 30 c.c. subcutaneously, repeated after 10 days. No animals showed parasites at any time after the injection though blood smears were taken hourly for 12 hours and thereafter every 12 hours for the next 24 hours and then every 48 hours.

The animals that had become infected showed the same clinical picture as those infected by needle passage. Parasites were found in the blood for 8 to 12 weeks, after which the cattle recovered, except for one animal which died of the infection after two weeks. Haemoglobin percentages fell after infection to between 30 and 50 per cent. (Tallquist) and then recovered.

(*c*) *Entomological*

The catches of flies taken from the cattle showed no difference as between the three kraals and grazing areas. Throughout the experiment *Musca* sp. and *Stomoxys* sp. were present at all seasons. They were found most abundantly in the cattle kraals. *Haematopota* sp. were numerous during the rainy periods (September to November and March to June), but were very scarce during the dry periods. They were taken mostly whilst the cattle were in the grass or at the water holes. *Tabanus* sp. were never numerous, though some were caught sporadically during the rains near to the water holes or at the kraals when there was surface water present. Mosquitoes, midges and fleas were caught off the cattle throughout the experiment. It was observed whilst feeding that the flies appeared to have predilection sites on the cattle. *Stomoxys* sp. bit mainly on the face, neck, flanks and legs whilst *Haematopota* sp. and *Tabanus* sp. preferred the flanks, the belly (underside) and the legs. *Stomoxys* sp. appeared to be a light and easily disturbed feeder, whilst *Haematopota* sp. was more persistent and sluggish during the period of feeding and not easily disturbed. *Tabanus* sp. attacked the cattle energetically though they appeared nervous and were easily disturbed during feeding. The animals were infested with *Rhipicephalus appendiculatus* throughout the experiment.

(*d*) *Mouse Inoculation Experiments*

At intervals flies were caught whilst feeding on infected cattle and were immediately crushed in saline solution (1 per cent.). This was done in a syringe and the resulting suspension was inoculated into mice by the intraperitoneal route, with the least possible delay. No cases of trypanosomiasis were obtained using *Stomoxys* sp. and *Haematopota* sp.

Experiment—Part II

The experiment was repeated using a strain of *T. congolense* Strain Yatta, which had been recently isolated from cattle in Kenya and twice passaged through mice. The experimental site and methods used were the same, except that (*a*) Kraal A was moved to the water edge ; (*b*) Kraals A and B each contained six clean cattle that had been used in the previous part of the experiment. Two inoculated cattle were introduced into each of these kraals and (*c*) the cattle in Kraals A and B were not harassed whilst confined to the kraals.

Four cattle were inoculated subcutaneously with blood from mice infected with *T. congolense*, Strain Yatta, and when positive, two were introduced into Kraal A and two into Kraal B.

The disease produced in the cattle inoculated from mice was more chronic than that produced by *T. congolense*, Strain 43. The four cattle became positive 14 days after inoculation. Parasites were found in all

blood smears over a period of 11 weeks. These cattle then became negative though all showed a few parasites on one or two days during the following five months. Clinically there appeared to be no loss in condition, appetite appeared normal though some increased thirst was noticed compared with in-contact cattle. Haemoglobin percentages fell by an average of 10 per cent. during the month following inoculation and then remained constant (one case) or returned to normal.

Results—Part II

One in-contact animal in each of the Kraals A and B became infected, the first infection in Kraal B after 59 days' and the second in Kraal A after 61 days' contact with the inoculated cattle. The course of disease in the cattle infected by transmission was similar to that in the inoculated cattle. The period during which parasites were present in consequentive blood smears was 22 and 50 days after which rare parasites were found at irregular intervals. None of the animals died of the infection with *T. congolense*, Strain Yatta.

Discussion

The experiment showed that the transmission of *T. congolense* in cattle does occur in areas where *Glossina* sp. are absent. Transmission by flies other than the tsetse is often termed mechanical transmission but Buxton (1948) points out that *cyclical* transmission of trypanosomes in flies other than *Glossina* sp. cannot be ruled out. Hornby (1952) reviews the question of mechanical and cyclical transmission of trypanosomiasis in East Africa, and mentions as occasional agents of mechanical transmission goads, needles used for making blood smears from a number of animals, digestion of infected meat and intra-uterine infections. He concludes that mechanical infection by flies other than tsetse is an important factor in the spread of trypanosomiasis.

Under experimental conditions Jowett (1911) showed that *Stomoxys* and *Haematopota* were capable of transmitting trypanosomiasis in sheep. Bouet & Roubaud (1912) obtained positive results using *Stomoxys* sp., and Neischulz (1940) using *T. congolense* in guinea-pigs showed that *Aedes aegypti* and *Stomoxys* could transmit the organism. Poulton (1933) by transferring feeding *Tabanids* and *Stomoxys*, in boxes, from infected to healthy cattle obtained infection. Hornby (1949), basing his hypothesis on the work of Bouet & Roubaud, which showed in transmission experiments that analogous results were obtained with *T. evansi* as with *T. brucei* and *T. vivax* using *Stomoxys*, accepts the results of Neischulz (1929) with *T. evansi* and applies these to all other trypanosomes. Neischulz (1929) lists the transmitters in order of importance, firstly the *Tabanids* with *Tabanus* better than *Chrysops* and *Haematopota*. The rôle of muscids and mosquitoes is considered to be small. In experiments, where the time between the introduction of the flies' proboscises into infected and healthy animals is known, mechanical transmission can be assumed. In the experiment described above, as in the field, where the time interval between bites is not known, the possibility of cyclical transmission cannot be ignored. Lamborn (1932 and 1933) has investigated the possibility of cyclical transmission of trypanosomes of animals by vectors other than *Glossina* and obtained negative results with *Tabanids* and *Stomoxys calcitrans*.

In addition to biting flies, *per se*, other possible vectors exist. The work of Thompson & Lamborn (1934) showed that the dejecta of non-biting flies which had fed on blood infected with *T. brucei* contained viable trypanosomes and if placed upon a fresh wound could infect. The fresh wounds included one from which blood was exuding following the bite of a *Tabanid*. Lamborn & Howat (1936) record the infection of a dog by *Musca sorbens* when it was transferred, after feeding on the blood of a patient, infected with *T. rhodesiense*, to a fresh cut on the dog's ear. The experimental cattle suffered skin trauma through the common causes that exist in this part of Africa, *viz.*, by biting flies, thorns and ticks and the excoriations caused by tick-eaters (the Red-billed Ox-pecker) and these wounds could have provided sources of contamination and sites for infection.

The method of herding cattle practised by the local Bahima cattle owners differs from that used in the experiment in two details. First the Bahima do not put their cattle into kraals during the day-time, and secondly when their cattle are driven into the kraals at night-time they are passed through the smoke of a " smudge fire " built of green grass, which disperses the flies that are being carried by the cattle. A feature of cattle grazing in Uganda is that the cattle always remain closely grouped together even when on open grazing. This is possibly a natural instinct for preservation from beasts of prey. This was very noticeable in the experimental cattle, and increases the chances of spread of infection.

A study of agents responsible for the transmission of trypanosomiasis within a herd in areas free of *Glossina* sp. may reveal that the importance of each vector varies from place to place. The spread of infection within a herd that is free of tsetse fly does not appear to conform to a pattern. In this experiment the spread of infection was slow—5 out of 16 animals (31 per cent.) became infected in 211 days, and 2 out of 12 (18 per cent.) in 61 days—but in the case reported by Barnett (1947) near Nairobi the outbreak was explosive in that 72 per cent. of milk and work cattle and 41 per cent. of dry cattle were infected in two months. The infection of a herd presupposes contact through *Glossina* sp. or other fly vectors with infected game or infected cattle outside the herd. Fiedler (1950) concluded that biting flies are incapable of spreading trypanosomes from game to domestic animals in Zululand. This possibly does not hold for other parts of Africa.

In conclusion, the results of this experiment indicate that while transmission of *T. congolense* in cattle does occur in areas free of *Glossina* sp. under a system of management similar to that used by native cattle owners, further work to identify the vector or vectors responsible and to evaluate the importance of each must be carried out.

Summary

Sixteen healthy cattle and four cattle infected with *T. congolense* were herded together under field conditions in an area free from tsetse flies. In 211 days 5 out of 16 (31·25 per cent.) healthy in-contact cattle became infected. At the same site, using another strain of *T. congolense*, 2 out of 12 (16·7 per cent.) in-contact cattle became infected in 61 days.

Siamese Twin-type Foetal Monstrosity in the Cat

BY
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I ENCOUNTERED this feline monstrosity—Siamese twins—at a parturition case. The bodies of the two kittens are united from the navel anteriorly. The radiograph shows clearly two separate vertebral columns, with two tails and duplicated fore and hind limbs. The head has four ears, one mouth and two nostrils. More precise details of the head could be obtained by dissection. Since the dam was presented at the surgery 48 hours after the end of labour, the foetal fluids had been expelled and the young, if they had lived at all, had been asphyxiated.

I have the original specimen in my possession.

Acknowledgments.—The experiment was planned by Dr. E. A. Lewis, Director of East African Tsetse and Trypanosomiasis Research and Reclamation Organisation, and Dr. J. I. Taylor, Chief Research Officer of the Uganda Veterinary Department. The area used for the experiment was allocated by the District Commissioner, Ankole. My thanks are also due to Dr. M. A. Soltys for his interest and advice.

References

BOUET, G., & ROUBAUD, E. (1912). Expériences de Transmission des Trypanosomiases Animales de l'Afrique Occidentale Française par les Stomoxes. *Bull. Soc. Path. Exot.* **5.** 544.

BUXTON, P. A. (1948). "Trypanosomiasis in Eastern Africa, 1947." pp. 9, 10, 19 and 44. H.M. Stationery Office, London.

BARNETT, S. F. (1947). Bovine Trypanosomiasis in Kenya, with Special Reference to its Treatment with Phenanthridinium 897. *Vet. Rec.* **59.** 459.

FIEDLER, O. G. H. (1950). Der Feldzug gegen die Tsetsefliege im Zululand. *Z. angew. Ent.* **31.** 509–536. Berlin, 1950. (Abstract *Rev. appl. Ent.* B. **40.** 90.)

HORNBY, H. E. (1949). The Development of our Knowledge of Animal Trypanosomiases. An Address in the Tanganyika Division of the National Vet. Med. Assoc. of G.B. and N. Ireland given at Mpwapwa on Feb. 24th, 1949. *Vet. Rec.* **61.** 375–379.

———. (1952). "Animal Trypanosomiasis in Eastern Africa, 1949." pp. 15-16. H.M. Stationery Office, London.

JOWETT, W. (1911). Further Note on a Cattle Trypanosomiasis of Portuguese East Africa. *J. comp. Path.* **24.** 29–35.

LAMBORN, W. A. (1932). "Medical Entomologist's Report for 1931." Ann. med. Rep. Nyasal., 1931. Appendix I. pp. 1–4. Zomba, 1932.

———. (1933). "Medical Entomologist's Report for 1932." Ann. med. Rep. Nyasal., 1932. pp. 54–60. Zomba, 1933.

——— & HOWAT, C. H. (1936). A Possible Reservoir Host of *Trypanosoma rhodesiense*. *Brit. med. J.* No. 3935. pp. 1153–1155. London.

NIESCHULZ, O. (1929). Zusammenfassung der Ergebnisse einiger Surraübertragungsversuche auf Java und Sumatra. *Arch. Schiffs. u. Tropenhyg.* **33.** 257. (Abstract *Rev. Appl. Ent.* B. **17.** 210.)

———. (1940). Ueber die mechanische Uebertragung von *Trypanosoma congolense* durch *Aedes aegypti*. *Arch. Schiffs. u. Tropenhyg.* **44.** Pt. 1, pp. 30–33. Leipzig, 1940. Versuche über die unmittelbare Uebertragung von *Trypanosoma congolense* durch *Stomoxys calcitrans*. T.c., Pt. 3, pp. 120–124. (Abstract *Rev. appl. Ent.* B. **28.** 179.)

POULTON, W. F. (1934). "Annual Report of the Veterinary Department, Uganda, 1933." pp. 37–38. Entebbe, 1934.

THOMSON, J. G., & LAMBORN, W. A. (1934). Mechanical Transmission of Trypanosomiasis, Leishmaniasis and Yaws through the Agency of Non-biting Haematophagous Flies. *Brit. med. J.* No. 3845. pp. 506–509.

WENYON. (1926). *Protozoology*. **1.** 513. Baillière, Tindall, & Cox, London.

Injection of Crystal Violet Swine Fever Vaccine in the Ear

BY

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THE immunising value of crystal violet vaccine injected intradermally in the ear has been investigated by D'Apice, Penha & Cury (1948), the injections being made on the lower external border. They found that 1 c.c. of vaccine injected in this site conferred protection 21 days later against the inoculation of virus and that protection was fully established about 15 days after vaccination. This is an important claim in view of the relatively high price of the vaccine, and a reduction to one-fifth of the minimum standard dose (5 c.c.) would effect an important economy in costs and production. American investigations (1953) confirmed that 0.5 c.c. and 1 c.c. of vaccine injected by this route protected pigs against the inoculation of virus 90 days later.

Present Investigation

The experimental pigs used in this work were all in good condition and were obtained from a farm where the stock is healthy.

Preliminary injection of 0.5 c.c. and 1 c.c. of vaccine intradermally in the ear proved this to be a delicate and time-consuming operation; each animal required rigid restraint and it was clearly not a method that could be recommended for routine work in the field. Having regard to these facts, it was decided to test the value of small doses of vaccine given subcutaneously in the ear, that is, between the skin and the conchal cartilage; there is little subcutaneous tissue in this site and injected material is absorbed slowly. In the results here recorded the vaccine was injected by this method in all tests except No. 5 which was a comparison between the intradermal and subcutaneous routes.

Test No. 1

Effect of Subcutaneous Vaccination in the Ear

The immunity of 28 pigs, 10 weeks of age, vaccinated subcutaneously in the ear was tested 30 days later either by subcutaneous inoculation of virus or by housing in-contact with infected pigs used in the routine preparation of vaccine. Unvaccinated control pigs were included in the contact tests; all of these became sick and were used for vaccine production.

It will be seen that 2 c.c. of vaccine given subcutaneously in the ear conferred complete protection, and 1 c.c. conferred good protection, when the animals were tested 30 days later.

Test No. 2

Vaccination Before and After Weaning

The immunity of 18 pigs, vaccinated either before or after weaning, was tested 90 days later against the inoculation of virus.

Six of eight pigs given 1 c.c. of vaccine before weaning died when challenged 90 days later: the results were better when vaccination was deferred until after weaning, only two pigs out of 10 dying, but the degree of protection was still insufficient.

TEST NO. 1 TABLE

Number of Pigs	Dose of vaccine	Immunity tested 30 days after vaccination, by	Result
10	1·0 c.c.	1,000 M.L.D. virus	8 remained normal —two reacted; recovered
4	1·0 c.c.	Contact infection	2 remained normal —two reacted; recovered
10	2·0 c.c.	1,000 M.L.D.	All remained normal
4	2·0 c.c.	Contact infection	All remained normal
1	Virus control	1,000 M.L.D.	Died 9th day

TEST NO. 2 TABLE

Number of Pigs	Dose of vaccine	Age when vaccinated. Weeks	Virus 90 days after vaccination	Results
8	1·0 c.c.	4	1,000 M.L.D.	6 died — 2 remained normal
10	1·0 c.c.	10	„	2 died — 5 reacted
2	Virus control	—	„	2 died

Test No. 3

Establishment of Immunity

To determine the onset of immunity following the subcutaneous injection of vaccine in the ear, 14 pigs were vaccinated and their immunity tested at varying intervals by the inoculation of virus.

TEST NO. 3 TABLE

Pig Numbers	Dose of vaccine subcutaneously in ear	1,000 M.L.D. virus after vaccination Days	Result
6783	1·0 c.c.	4	D. 14th day
6760	„	6	D. 14th day
6758	„	8	D. 18th day
6788	„	10	D. 18th day
6756	„	12	D. 18th day
6759	„	14	D. 23rd day
7248	„	15	Severe reaction—recovered
6755	„	18	D. 30th day
7250	„	18	Reacted—recovered
6757	„	20	Reacted—recovered
7116	„	20	Remained normal
7251	„	22	Reacted—recovered
7247	„	25	Remained normal
7114	„	27	Remained normal

D = Died

It would appear from these results that the immunity conferred by 1 c.c. of vaccine subcutaneously in the ear was not fully established until between the 20th and 25th day after vaccination. In the routine field method—5 c.c. of vaccine injected into the loose subcutaneous tissue immediately behind the ear or into the axilla—immunity is established by the 14th day. The delayed onset of immunity following subcutaneous injection in the ear probably results from a slower rate of absorption and a smaller dose of vaccine.

Test No. 4

Duration of Immunity

Thirty-four pigs, 29 vaccinated before weaning and five after weaning, were tested after intervals of five to eight months.

TEST NO. 4 TABLE

Number of Pigs	Dose of vaccine	Age when vaccinated weeks	1,000 M.L.D. virus after vaccination Months	Results	
				Died	Reacted
11	1·0 c.c.	4	8	11	some reacted and recovered
18	1·0 c.c.	4	7	9	
5	1·0 c.c.	10	5	2	

Little protection was conferred by 1 c.c. of vaccine on unweaned pigs tested seven and eight months later; the protection conferred on weaned pigs tested after five months was insufficient to be of practical value.

Test No. 5

Comparison between the Subcutaneous and Intradermal Routes

Twenty-three pigs, 10 weeks old, were vaccinated in the ear, 11 subcutaneously and 12 intradermally; a group of four were left unvaccinated as controls. Six months later, the 27 pigs were put in-contact in a yard with four pigs inoculated with virus.

TEST NO. 5 TABLE

Number of pigs	Dose of vaccine	Route of vaccination	Test against contact infection Months	Result
11	1·0 c.c.	s/c	6	3 died—others reacted—recovered
12	1·0 c.c.	i/d	6	6 died—others reacted—recovered
4	unvaccinated controls, virus pigs		—	4 died
4			—	4 died

Six (rate of 50 per cent.) of the 12 pigs vaccinated intradermally died in an average time of 14 days; three (rate of 27 per cent.) of the 11 vaccinated subcutaneously died in an average time of 18 days. It would appear that vaccine given subcutaneously in the ear confers a better protection than when it is given intradermally. By either route, 1 c.c. of vaccine failed to confer a practical degree of protection after six months against contact infection.

Discussion

The intradermal injection of crystal violet vaccine in the ear is a delicate and time-consuming procedure that would be impracticable on any considerable scale under field conditions. The skin of the pig's ear is thin and hard and the intradermal injection of 0.5 c.c. or 1 c.c. of vaccine frequently causes a bleb which may be subsequently burst with loss of unadsorbed vaccine. The amount that can be readily injected intradermally is too small to confer a durable immunity; but a small dose, given intradermally or subcutaneously in the ear, confers a better protection than the same dose injected subcutaneously or intramuscularly in one of the usual sites. D'Apice and his co-workers found that the intradermal route did not appreciably shorten the time required for the establishment of immunity as compared with the 14 days for the standard dose of 5 c.c. subcutaneously; but it would appear from our experiments that when vaccine is given subcutaneously in the ear, the onset of immunity is considerably slower—about 20 to 25 days. Vaccination in the ear gave better results with weaned than with unweaned pigs. Although vaccine given subcutaneously in the ear requires more time for the establishment of immunity, it would appear to confer better protection than when given intradermally. There is a close relationship between the size of dose of crystal violet vaccine and the duration of immunity, and having regard to the time factor involved, the need for special restraint and the small dose that can be employed, the ear route would not appear to be of practical value under field conditions.

Acknowledgment.—We wish to express our indebtedness to Mr. R. Martin for technical assistance.

References

D'APICE, M., PENHA, A. M., & CURY, R. (1948). *J. Amer. Vet. Med. Assoc.* **112**. 230.

Report Chief, Bureau of Animal Industry, Washington 1953, 57.

"THE INCISOR"

We have received the summer number of this lively journal, the magazine of the Royal Veterinary College. Its editor and committee—to say nothing of its advertisement manager—have succeeded admirably in their task of creating a mirror of the College's activities, and moreover, we are informed, of setting it up without the necessity for one of those financial *post-mortems* which are the bane of undergraduate literature. The contents, to say the least, do not fall into the error of being unduly academic, and though one of our own correspondents this week might occasionally lift a fastidious eyebrow at some of the syntax the general effect is wholly agreeable.

The reader has the impression that the student body of the College has plenty of vitality, that the various clubs and associations are healthy, and that, in general, the teaching staff have their hands pretty full with this vivacious body of incipient veterinarians—which is just as it should be.

A Method for the Eradication of *Str. agalactiae**

WHEN it was first shown in 1933 that it was possible to eradicate *Str. agalactiae* from an infected herd of cows and to maintain it free from infection, reliance was placed on separation of the infected animals and their eventual removal. The process was a slow one and subsequent observations in other herds showed that it was difficult to prevent spread of infection, and that in only a small number of herds was the method successful within a reasonable period of time.

With the development of treatment by means of the acridine dyes, the process was hastened, but more or less severe reactions sometimes occurred, and prevented widespread use of these drugs. The sulphonamides followed and, apart from their good effects on clinical mastitis when given by the mouth, proved valuable agents for sterilisation of udder infections when injected in oily suspension. They were however quickly superseded by penicillin which, by its high degree of efficiency, ability to act in the presence of pus and complete freedom from irritant or toxic effects, took and has retained its place as the best method of dealing with *Str. agalactiae* infections. The introduction of single dose containers also removed the previous danger of udder infection with tuberculosis by unwitting transference during mastitis treatment.

In the last 10 years a great deal of work has been done by members of the Mastitis Conference of the Agricultural Research Council and others to find the most effective doses and preparations of penicillin and the best methods of operation in herds. First came aqueous solutions, which are effective if frequently repeated, then those in vegetable oil or oil/wax which have a longer persistence, next procaine penicillin and, finally, procaine penicillin in mineral oil, which at 100,000 units usually provides an effective level for three days, and a longer persistence if the dose is larger. Methods have also passed through the stages of treatment of infected quarters only, treatment of all quarters of infected cows, treatment of all cows, and treatment of all cows with disinfection of hands, udders, cows and premises. It is now generally agreed that simultaneous treatment of all quarters of all infected cows with use of an antiseptic cream on hands and udders is sufficient, unless infection is widespread, when treatment of all cows may be advisable.

Str. agalactiae has now been eradicated from many hundreds of herds in one county of England and from a large number of herds in various other parts of Great Britain, with considerable increases of milk yield. With the removal of *Str. agalactiae*, it has also become easier to devise methods for the control of the other forms of mastitis, where these occur.

It is considered therefore that the time has now come when the findings of the various people who have been working on the eradication of *Str. agalactiae* from infected herds should be compounded into a practical scheme which can be set down to serve as a guide to the veterinary surgeon in practice. In formulating this scheme, consideration has been given to minimising both the cost and the labour involved. It is felt that the method described below will prove to be both a practicable and an economical way in which to eradicate *Str. agalactiae* from the greatest number of herds.

General Considerations

It is necessary to make a preliminary bacteriological examination of the herd to find out the nature and degree of infection, because *Str. agalactiae* is not the only organism responsible for mastitis.

Before setting out the scheme certain facts regarding *Str. agalactiae* and the methods of curtailing infection in the herd require to be stated.

1. *Str. agalactiae* is an obligatory parasite of the udder and, with certain well-known exceptions, does not multiply in any other site. The exceptions are that it does multiply on teat-sores, and may do so in sores on milkers' hands, and that it can establish itself as part of the normal flora of the human throat. It is because of this restricted habitat that eradication is possible.

2. *Str. agalactiae* is sensitive to penicillin and there is no evidence whatever that penicillin-resistant strains of this organism can develop. Because it is cheap and non-irritant, penicillin will probably remain the antibiotic of choice for removal of this infection.

3. Mastitis due to *Str. agalactiae* is contagious and infection is chiefly spread during milking. The route of infection is always via the teat-canal.

4. There is no immunity to re-infection as a result of a natural attack of the disease.

5. Penicillin will remove infection from more than 90 per cent. of infected cows but not 100 per cent. As said above, this is not because of developed resistance to its action by *Str. agalactiae* but probably because of the nature of the lesions in certain cows.

6. In order to control herd infection it is necessary to supplement the therapeutic action of penicillin by the use of disinfectants to destroy *Str. agalactiae* in those sites which are of immediate danger in providing foci of re-infection. The chief sites which constitute such reservoirs are believed to be the surface of the teat and the hands of the milker, and in the early stages of herd treatment it is recommended that disinfectants be applied to these sites.

Disinfectants added to the washing water must be used in the proper strength and changed as soon as their efficiency has been impaired by organic matter. It is advisable to have a separate sterile udder cloth for each cow, but failing this at least two should be used with one resting in disinfectant while the other is being used. The hands of the milkers should be dressed before each milking with an efficient antiseptic

* Prepared by the Technical Committee on Mastitis of the Agricultural Research Council.

cream for at least 10 days from the first day of treatment.

In machine milked herds the cluster should be dipped in disinfectant before milking each cow, and hand-stripping, it it is practised, should be replaced by machine stripping. In hand-milked herds the milker should wash his hands with disinfectant before milking each cow.

7. It is inadvisable to treat a herd which is affected with teat-sores until they have been cured or have disappeared spontaneously; this sometimes occurs with better management and improved weather conditions, especially in herds which are outwintered.

8. The better the co-operation of the farmer and his cowmen the more likely is eradication to be achieved quickly.

Recommended Method

1. A preliminary examination of the whole herd should be made using udder samples collected in screw-capped bottles. The collection of milk samples may be made by the farmer himself. When this examination discloses *Str. agalactiae* the procedure should be as follows :—

2. All cows found to be infected and dry cows should be treated in such a way as to maintain a sufficient concentration of penicillin in the quarter for six days. Methods recommended for this include procaine penicillin in mineral oil, two doses of 100,000 units per quarter with an interval of three days between the two treatments. At the same time attention must be given to the milkers' hands and cows' teats as advised in the preamble. All animals should be treated on the same day (or in a large herd on succeeding days). If a herd is highly infected it may be desirable to treat every cow.

3. Post-treatment tests of the herd should be made, samples being taken directly on to a medium selective for *Str. agalactiae*. The first post-treatment test should be six weeks after treatment and thereafter the herd should be examined at six-monthly intervals. A herd found to be free from infection at two consecutive six-monthly tests need only be examined once yearly thereafter.

4. Any infected cow disclosed at these examinations should be treated as before and milked last until cured or removed. A cow which resists two treatments will have to be considered individually and dealt with according to the circumstances.

Prevention of Re-infection with *Str. agalactiae*

Once a herd has been freed from infection with *Str. agalactiae*, experience shows that it will remain free provided that fresh introduction of infection is avoided. There are three main ways by which infection can re-enter a herd.

1. By the purchase of an infected cow. An eradication programme such as this is only practicable in herds which are self contained or nearly so. Any purchased cow should be considered to be infected and treated immediately.

2. By way of heifers. These, whether purchased or home-bred, may calve down with *Str. agalactiae* in their udders, though this is relatively uncommon. Calves reared in groups, and more particularly when bucket fed, form the habit of sucking one another. If the milk used for feeding is infected, then one calf can implant infection in the immature udder of another where it may remain until she calves..

3. On the hands of a milker who has come from an infected herd. No new milker should be allowed to milk cows without first disinfecting his hands thoroughly and he should use disinfectant cream on his hands for 14 days.

There are other less common methods by which infection can be reintroduced such as on the handles of churns returned from a dairy, but it is felt that such risks are minimal and the measures necessary to combat them are not justified by the danger involved.

The Viability at Low Temperatures of a Dried Egg-Adapted (Kenya Vaccine) Strain of *Asterococcus mycoides*

BY

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THE isolation of the T.1 strain of the organism of contagious bovine pleuropneumonia, and its adaptation to the embryonated egg, was described by Sheriff & Piercy (1952, 1953). This egg-adapted strain was shown to possess extremely good immunising properties for East African cattle, and is now used as the standard vaccine for contagious bovine pleuropneumonia in Kenya and Tanganyika.

The following investigation was instituted to determine whether the vaccine remains both viable and antigenically potent for long periods under normal conditions of storage at low temperatures (*i.e.*, at between $-20°$ to $-28°$ C.).

Materials and Methods

An early batch of the vaccine was employed (Batch PP.34, produced 4.2.52), the preparation and testing of which was described by Sheriff & Piercy in their original report. This had been freeze-dried in ampoules, sealed-off under vacuum, and then stored in a deep-freeze for two and a half years. An ampoule was reconstituted in distilled water on August 26th, 1954, and used within two hours for the following viability and potency tests.

Four tubes of Martin's horse-serum broth and 32 embryonated eggs (at the eighth day of incubation) were inoculated with the reconstituted material, incubated at 37° C. and observed daily. In order to test the potency in cattle, the vaccine was further diluted to 1:10 and 1:20 in distilled water. Three animals for each dilution received 1 ml. of vaccine subcutaneously behind the left shoulder.

Results

During the third, fourth, and fifth days the majority of the eggs died in the normal death-pattern

TABLE I
VIABILITY TESTS

Days post inoculation	Deaths in embryonated eggs (32)	H. S. B. Cultures 1 2 3 4
1	4	– – – –
2	0	– – – –
3	12	– – – –
4	10	– – – –
5	2	– – – –
6	0	– – – –
10	–	+ – + +
21	–	+ – + +

to be expected following inoculation with the T.1 strain. *Asterococcus mycoides* was recovered from them on culture. From the 10th day after inoculation three of the four H.S.B. tubes showed a progressive growth of the organism. The fourth tube and the media controls remained sterile.

No local reaction to the vaccine occurred in any of the cattle. After 35 days all animals were challenged by the subcutaneous inoculation (behind the right shoulder) of 1 ml. of hypervirulent "lung lymph"—strain Ngong 1/54, obtained from an active case of the disease in the field. Four control animals were similarly challenged. Three controls died, showing typical reactions to challenge, on the 19th, 31st, and 35th days after inoculation. The survivor developed an extensive local C.B.P.P. reaction and a high complement-fixing serum-antibody titre (1:320). All the vaccinated animals survived, though one developed a very small local reaction and two developed a small pyogenic abscess at the site of the challenge inoculation, "field technique" having been employed throughout, without specific attention to asepsis.

Discussion

The degree of protection conferred by this batch of vaccine, when used undiluted by Sheriff & Piercy in 1952, was sufficient to prevent any local reaction in cattle challenged by "lymph" which killed three out of four unvaccinated animals. When re-tested two and a half years later, although diluted to 1:10 and 1:20 on this occasion, only one vaccinated animal out of six showed a very small reaction. This is particularly remarkable since the challenge material used for the re-test was probably considerably more virulent than that used initially, the Ngong 1/54 strain having produced devastating results previously, both in the field and the laboratory.

Conclusions

After two and a half years *in vacuo* at deep-freeze temperature, Batch PP.34 of the Kenya "egg-adapted" contagious bovine pleuropneumonia vaccine was viable, infective and lethal for embryonated eggs, and still capable of inducing a degree of immunity in cattle which was indistinguishable from that produced when the batch was initially tested in 1952. Local reactions to the vaccine itself were negligible at the first test and absent at the second. Thus no significant change had occurred in this respect.

This represents a great advance upon the old "wet" culture vaccine, which in addition to being difficult to store was inclined to reveal unaccountable variations in virulence and potency.

Summary

1. A batch of T.1 strain egg-adapted contagious bovine pleuropneumonia vaccine was re-tested after two and a half years low temperature storage.

2. No appreciable change had occurred in its immunising or other properties during this period.

Acknowledgment.—My thanks are due to the Director of Veterinary Services, Kenya, for facilities provided and for permission to publish the foregoing article.

References

SHERIFF, D., & PIERCY, S. E. (1952). *Vet. Rec.* **64**. 615.
———, & ———. (1953). *Proc. Int. Vet. Cong. Stockholm.* (1953).

TABLE II
MAXIMUM LOCAL REACTIONS IN CATTLE CHALLENGED

	Reactions (inches)									
	VACCINATED						CONTROLS			
1952	1	2	3	4	5	6	7	8	9	10
Vaccine Dilution	Nil	Nil	Nil	Nil	Nil	Nil				
Pre-challenge	0	0	0	0	0	4×4	–	–	–	
Post-challenge	0	0	0	0	0	0	Died	Died	10×8	
1954										
Vaccine Dilution	1 : 10	1 : 10	1 : 10	1 : 20	1 : 20	1 : 20				
Pre-challenge	0	0	0	0	0	0	–	–	–	–
Post-challenge	1×1	0	P.A.	0	0	P.A.	Died	Died	Died	10×16

P.A.—Pyogenic abscess.

Current Literature

ABSTRACTS

Emergencies in General Practice—Agricultural Pesticides. EDSON, E. F.* (1955). *Brit. med. J.* April 2nd, 1955. 841–844.

Also Editorial headed **Agricultural Poisons.** *Ibid.* 836–838.

It is estimated that in the four or five months from April of this year over 2,000,000 acres of this country will be sprayed with crop-protective chemicals. About one-tenth of this acreage will involve the use of hazardous pesticides often under conditions of some risk. Many real steps have been taken to ensure the safety of workers from these modern agricultural operations. Eight agricultural deaths occurred between 1946 and 1951, all in contract spraying operations in hot weather, from the intensive use of DNC as weed-killer, obviously without safety precautions. There have also been a number of cases of mild poisoning, but it is encouraging that there has been no fatality or serious accident from the use of DNC since 1951, despite its wider use. The death of a glasshouse worker occurred in 1954 in Guernsey due to over-absorption of parathion, an organic phosphorus compound used as an insecticide.

The pesticides in common use can be classified according to their application as general herbicides, selective weed-killers, fungicides, crop defoliants, insecticides and acaricides. Some chemicals have more than one of these actions, thus DNC may be used as a selective weed-killer, a fungicide or an insecticide and acaricide.

The toxic actions of some of the chemicals used are already well known, *e.g.*, sodium chlorate, arsenic compounds, derris, pyrethrum, DDT, BHC and nicotine compounds. It is the toxic potentialities of some of the newer compounds mentioned in this article that merit attention.

DNC (dinitrocresol or dinitro-ortho-cresol) rapidly upsets carbohydrate metabolism and increases the basal metabolic rate, an effect usually tolerable in cool or cold weather, but liable to cause dangerous effects when heat loss is limited by, for example, hot sultry weather. Repeated small doses of DNC given by mouth to human volunteers cause the concentration of the blood to rise, without causing symptoms, to a level of about 20 μg. per g. of whole blood. At this point the administration of a further small dose, less than 1 mg. per kg. body-weight causes a sharp rise in the concentration of DNC in the blood associated with the onset of signs of poisoning.

An outstanding symptom of DNC poisoning in the human subject is profuse and continuous sweating ; the pulse is fast ; the patient is dyspnoeic and complains of weakness. The sclera and skin are stained yellow. The staining of the skin is a persistent dye action and needs days or even weeks to wear off and is not any indication of the severity of the case.

There is no known specific antagonist to the action of DNC in the body and treatment is aimed at the rapid promotion of maximum heat loss, and the complete relief of anoxia, restlessness and dehydration.

All present-day organic phosphorus insecticides cause similar toxic effects by inactivating acetylcholinesterase enzyme of the tissues and thus permitting acetylcholine to accumulate dangerously. Since acetylcholinesterase enzyme only regenerates slowly, frequent small over-exposures are cumulative in their effects but often symptomless until the acetylcholinesterase enzyme reserves fall to a critically low level. Illness than occurs, first affecting involuntary muscles and secretory glands, then the voluntary muscles and finally vital brain centres.

The specific antagonist to organic-phosphorus-induced hypersecretion, involuntary muscle contraction and some central effects is atropine sulphate. The atropine dosage required in organic phosphorus poisoning vastly exceeds orthodox dosage schedules for this drug.

It is of vital importance not to confuse DNC poisoning with organic phosphorus poisoning for atropine given in DNC poisoning will stop sweating and the patient may then die.

Organic mercurials occur in many fungicidal seed-dressings and spraying mixtures. Fatalities have occurred in Europe owing to the volatility of ethyl and methyl compounds, but inhaled dusts are also hazardous. The possible effects include gastric upsets, trembling, ataxia and nervous irritability. Exposed skin may show evidence of primary irritation. Dimercaptol therapy should be carried out in severe cases. Dimercaptol therapy is now recognised as the specific antidotal treatment for poisoning with arsenical compounds.

G. F. B.

L. canicola **Infection Treated by Penicillin.** CROOKS, J., & BLAIR, W. (1955). *Brit. med. J.* April 9th, 1955. 885–887.

Reference is made to the review of the literature by Bloom, who believes that the infectivity of *L. canicola* for human beings is low since it is usual to find only these in a household who have nursed an infected dog and who have cleaned up its dejecta are liable to contract the disease. Although the routes of infection are not known with certainty, the entry would appear to be through intact or broken skin, mucous membranes of the upper respiratory tract or the conjunctiva.

The clinical features are those of an influenza-like illness of sudden onset, with signs of meningeal irritation appearing early in the illness of about two-thirds of cases.

This report describes two human cases, one in a housewife and one in a laboratory worker. In the second it was possible to estimate the incubation period. Both were treated successfully with penicillin.

The housewife had been ill for four days before admission to hospital. Enquiry revealed that during the two weeks preceding her illness the patient had nursed a sick dog. The veterinary surgeon who had been treating the dog stated that while he had no bacteriological confirmation he thought the case was likely to be one of *L. canicola* infection.

In view of this history a provisional diagnosis of " canicola fever " was made, and after blood specimens had been obtained, treatment with penicillin was instituted. Crystalline penicillin was given intramuscularly in doses of 250,000 units six-hourly. Within 24 hours there was a relief of symptoms and after 48

* From the Medical Department, Fisons Pest Control Ltd., Cambridge.

hours apparent clinical cure. The patient was discharged after 14 days' treatment with penicillin.

Blood cultures were negative, but serological tests confirmed the diagnosis in both the patient and her dog, the dog's serum agglutinating *L. canicola* to a titre greater than 1 : 30,000.

The second case involved a lecturer in veterinary medicine. Seven days before he became suddenly acutely ill, he had broken a tube containing a culture of *L. canicola* and in so doing had cut his finger. He had immediately washed the wound with a solution of penicillin. The nature of his illness was not realised until the third day of illness when the history given above was remembered by the patient. One million units of crystalline penicillin was given intramuscularly. Two and a half hours after the injection he had a very severe reaction. He had a severe rigor and his temperature rose from 104° to 105° F. An hour later he felt better. Five and a half hours after the first injection he was given a second dose of 1,000,000 units of penicillin. Two and a half hours later there was a marked improvement in his condition. Progress under penicillin therapy was thereafter uninterrupted.

After four days' incubation *L. canicola* was isolated from a culture inoculated with clotted blood.

It is pointed out that the ubiquity of *L. canicola* in this country is such as to make infection with this organism a possibility in every case of obscure fever.

The very rapid response to penicillin therapy in high dosage in these cases strongly suggests a therapeutic effect. The severe reaction in the second case is further evidence of the lethal effect of penicillin on the organism.

The authors point out that the evidence in favour of chlortetracycline (aureomycin) is inconclusive since treatment with penicillin had preceded the use of chlortetracycline. The work of Heilman is quoted, which showed that in experimental *L. canicola* infection in hamsters the protective effect of penicillin was greater than that of streptomycin.

G. F. B.

DIGEST

The effect of reserpine on the dog

Reserpine is an alkaloid of the shrub, *Rauwolfia serpentina*, which has been used as a medicinal agent in India for centuries, but has only recently been introduced into Occidental medicine for the treatment of high blood pressure in man. The therapeutic effects of reserpine are described as sedation, myosis, a lowering of blood pressure, and body temperature with an increase in intestinal movement, and the depth of respirations. Connor and Hass have recorded the effects of reserpine administered by mouth, three times a day, to healthy dogs weighing 20 to 30 lb. at the dosage rates of 0.250 mg., or 0.125 mg. for 21 days. The higher dose induced lethargy, inco-ordination, tremors, vomiting, diarrhoea, oedema of the eyelids with the nictitating membrane extended across the cornea, and a slow powerful heart beat. Dogs receiving the lower dosage rate of 0.125 mg. reserpine, which approximates the human dose, on a weight basis, were very quiet, but not sleepy, and all animals developed a slow heart beat.

Vasectomy in the bull

The use of a vasectomised bull for the identification of cows in oestrus, is recommended by Tharp, for herds of beef cattle in which artificial insemination is practised, and where the signs of heat are often obscure. For the operation of vasectomy, a healthy, unused bull, one year old, was cast on its left side, with both legs pulled alongside the abdomen. The scrotum was drawn back between the hind legs to expose its anterior surface. This site was selected for the operation because it suffered the minimum amount of interference from the external cremaster muscle. An area extending three inches ventrally from the scrotal attachment and half an inch on each side of the medial raphe, was shaved, washed, and locally anaesthetised. An incision was made through the skin and tunica vaginalis. The vas deferens which was to the medial and posterior aspect of the spermatic cord, was picked up with a ligating hook, and after being separated from the cord, was fixed by artery forceps, ligatured at each end, and one inch of its length removed. The other vas deferens was treated in a similar fashion, and the incisions in the skin were then sutured with cruciate type stitches. The treated animal made an uneventful recovery, and normal libido was retained.

An attachment for an inspection table

An attachment which may add to the efficiency of the table used for the examination of small animals is described by Lumb. It consists of a metal rod which is passed vertically through a hole at one end of the table. The rod is held in this position by a screw, which can be adjusted to allow the rod to be raised or lowered. The top of the metal rod carries a hook to which a choke chain can be attached for the restraint of a dog. The rod may also provide support for a small tray, an additional light, or the container for an intravenous infusion apparatus.

Vitamin A deficiency and blindness in cattle

A vitamin A deficiency is considered to interfere with the activity of osteoclasts, which are responsible for bone resorption. One result of this condition is that some foramina in the skull are imperfectly formed, and cause pinching of the nerves and vessels as they pass through these openings. The optic nerve is very susceptible to this form of damage, and affected animals are thereby blinded. Donoghue has described four cases of blindness in calves which he considers to have been due to a lack of vitamin A. The animals were Hereford yearlings and came from three separate herds in Alberta, Canada. Examination of the eyes showed that there was an absence of gross lesions, although there was no response to light. A *post-mortem* examination of two of the four animals was carried out and revealed pinching of the optic nerve in the foramen through the sphenoid bone. Donoghue states that the existence of a vitamin A deficiency among cattle in Alberta has been established. However the cause for this condition is still being investigated, although the feeding of poor quality hay to housed cattle during winter is believed to be a contributory cause.

The treatment of demodectic mange in the dog

Professor Koutz, of the Ohio State University, has completed a series of papers on demodectic mange in the dog, with a review of the methods of treatment. He described 25 of the many treatments which have been introduced to alleviate this condition since the demodectic mite of the dog was demonstrated in 1843. Preparations containing benzene hexachloride, benzyl benzoate, and rotenone are considered to be the most effective. The following system of treatment is recommended, with the proviso that until the precise aetiology of demodectic mange is determined, the results of any therapeutic agent will be erratic. The dog is clipped and washed in soap and water, a benzyl benzoate, benzene hexachloride emulsion is applied for 10 days. A period of rest follows, during which time the dog is washed again, using 1 per cent. selenium sulphide, after which the treatment is continued with the application of a rotenone preparation.

Diseases of goldfish

These notes on the diseases of goldfish have been taken from an abstract in the *J.A.V.M.A.* (1954), in view of the recent request for advice on this subject.

The local application of iodine, or mercurochrome, to mycotic lesions on the scales is advised. After this treatment the fish should be isolated in a salt bath, which is prepared by adding one tablespoonful of salt to each quart of water. The fish can be left in this water for three to four days. A bacterial condition of the mouth erroneously but descriptively named "mouth fungus," apparently responds to 250 mg. of aureomycin added to the water, followed by a salt bath. The diseases known as "tail rot" and "fin rot" can also be cured by this treatment. The presence of knots in the string of excreta hanging from the cloaca of a goldfish is apparently a manifestation of constipation, and for this condition, one teaspoonful of mag. sulphate per quart of water, is the aperient of choice.

D.W.J.

References

ANON. (1954). Diseases of goldfish. *J.A.V.M.A.* **125** (933). 464.

CONNOR, N. D., & HASS, K. B. (1955). *J.A.V.M.A.* **126** (935). 137–138.

DONOGHUE, J. G. (1955). *Canad. J. Comp. Med. & Vet. Sci.* **19** (2). 61–64.

KOUTZ, F. R. (1955). *North Amer. Vet.* **36** (2). 129–131 & 136.

LUMB, W. V. (1955). *Ibid.* **36** (2), 133.

THARP, V. L. (1955). *J.A.V.M.A.* **126** (935). 96–99.

Victoria Veterinary Benevolent Fund

A meeting of the Council of the Victoria Veterinary Benevolent Fund was held at No. 10, Red Lion Square, London, W.C.1, on Friday, April 15th, when the following members were present:—

Major J. J. Dunlop, Mrs. D. I. Glover, Professor J. McCunn, Professor W. M. Mitchell, Professor L. P. Pugh, Capt. Wm. Watt and Major W. H. Wortley. Mr. C. W. Francis, Secretary, was in attendance.

Chairman. In the absence of the President, who was indisposed, Professor L. P. Pugh, Vice-president, was appointed to the Chair.

Professor Pugh proposed from the Chair that a letter be sent to Mr. H. W. Dawes expressing the Council's regrets at his illness and that he will make a speedy recovery to good health. This was warmly supported.

Minutes. The minutes of the previous meeting, held on January 7th, 1955, having been published in THE VETERINARY RECORD, were taken as read and signed as correct.

Apologies for Absence. Letters of apology for absence were received from: Professor R. Lovell, Mrs. D. McNabb (President of the Ladies' Guild), Capt. T. M. Mitchell, Dr. R. F. Montgomerie, Mr. J. N. Ritchie, Major C. W. Townsend, Capt. A. Whicher and Professor G. H. Wooldridge.

Correspondence. The Secretary read the following:—

(a) A letter from Messrs. Teasdale, Hewitt & Holder, Solicitors, informing the Council that the late Capt. J. W. Procter had, under the terms of his will, left the Fund a legacy of £50.

(b) A letter from Messrs. Robertson, Dempster & Co., advising the Council that the legacy of £1,000 due from the estate of the late Peter Conacher, who resided in South Africa, should be received by the Fund early in May.

Hunting Trust. The Secretary reported that the Trustees of the Hunting Trust had, on March 11th, 1955, in accordance with the terms of the Trust, authorised the transference of the sum of £609 18s. 2d. to the General Account of the Fund, this being the surplus for the year as disclosed by the audited accounts.

Treasurer's Report. The Treasurer reported that he had instructed the Secretary to invest the sum of £609 18s. 2d. received from the Hunting Trust, which was reported earlier in the meeting, in the purchase of £742 8s. 3d. 3½ per cent. Conversion Stock, 1961.

It was resolved—

That the action of the Treasurer be approved.

Accountant's Report The following report was read and approved, a warm vote of thanks being accorded to the respective donors:—

Since the previous meeting, the following legacy and donations have been received:—

	£ s. d.	£ s. d.
Legacy		
Capt. J. W. Procter		50 0 0
Donations		
Anon	5 5 0	
Eastern Counties Veterinary Society	10 0 0	
Guildford, Woking & Haslemere Canine Society (*per* Mrs. M. M. Calder) ...	2 2 0	
Harmar, J. B.	18 0	
Hughes, Ivor	1 1 0	
Kensington Canine Society (*per* Miss B. M. Murray) ...	2 2 0	
North Bucks Beagles	2 2 0	

North of England Veterinary Medical Assoc. (proceeds of dance)			60	19	3	
North of Ireland Veterinary Medical Association ...			20	0	0	
Scottish Metropolitan Division, B.V.A.			10	0	0	
Sussex Veterinary Society ...			10	0	0	
Wellingborough & District Canine Society (*per* Dunlop and Edwards)			2	2	0	
Yorkshire Veterinary Society			5	5	0	
						131 16 3
Collecting Boxes						
Central Veterinary Society ...			3	17	0	
Eastern Counties Veterinary Society			3	17	6	
North of Ireland Veterinary Medical Association ...			5	18	11	
Scottish Metropolitan Division, B.V.A.						
	1	12	9			
	2	6	2			
				3	18	11
South-East Midlands Veterinary Medical Association ...			6	2	8	
						23 15 0
						£205 11 3

The Secretary also reported that as a result of an appeal made by Mr. E. P. Barrett, M.R.C.V.S., to members residing in Surrey for new subscribers, the following had responded:—

Fifteen members had completed a covenant to pay a subscription of £1 1s. for seven years, and two similarly for 10s. 6d. One member had signed a banker's order for an annual subscription of £1 1s. and another for the sum of 10s. 6d.

The Chairman expressed the hope that many more promises to help the Fund would be received between now and our next meeting.

Cases

No. 295. Widow, aged 40. One daughter, aged five. The Secretary reported the contents of a letter received from this recipient on March 31st, and stated that she was at present receiving a grant of £13 per month.

It was agreed that the action taken by the Executive Committee be approved and that it be left to this Committee to take such further steps as it may consider necessary.

No. 303. M.R.C.V.S. The Secretary informed the meeting that this member qualified in December, 1953, that in January, 1955, he returned to this country from Pakistan to take up an appointment but not having complied with the terms of the agreement, his employer declined to engage him. Having been unable to obtain employment within the profession he applied for assistance from the Fund and the Executive Committee voted him a grant of £4 per week for one month.

No. 304. M.R.C.V.S. Three children, son (married) aged 29, two daughters, ages 22 and 12. A letter was read from this member asking the Fund for urgent financial assistance. The Secretary reported that the Executive Committee, in the very special circumstances, made a special grant of £25 in this case.

It was resolved—

That the action taken by the Executive Committee in cases Nos. 303 and 304 be confirmed.

No. 305. E. M., aged 58. Husband died in 1942. Four married daughters (unable to help) and one son, aged 29. Applicant keeps house for son from who she occasionally receives pocket money.

It was resolved—

That a grant of £2 per week be made in this case for a period of six months, after which it be reviewed.

Annual Report. Subject to a few minor alterations the draft Annual Report and Statement of Accounts which had been circulated was approved for issue to the members of the Fund.

Date of next Meeting. It was decided that it be left to the Executive Committee to arrange the date of the next meeting of Council.

Vote of Thanks. On the proposition of Professor W. M. Mitchell, a hearty vote of thanks was accorded to Professor L. P. Pugh for his conduct in the Chair.

News and Comment

UNIQUE HONOUR FOR VETERINARIAN

At a meeting of the Council of the Royal College of Surgeons of England, held on April 21st, 1955, Professor James McCunn was elected a Fellow of the College. He was admitted to the Fellowship at the meeting of the Council on Thursday, May 12th. The Fellowship of the R.C.S. ranks as one of the highest surgical honours in the world.

Professor McCunn graduated M.R.C.S. in June, 1924, and we believe that this is the first occasion on which this signal honour has been conferred by election on a member of the veterinary profession.

ROYAL VETERINARY COLLEGE ATHLETICS

The ninth annual Sports Day of the College Athletic Club was held on Goring Athletic Ground, on May 14th. The weather remained fine but the cold wind was not ideal for running and no records were broken. All events were keenly contested. Fourth Year won the Greatorex Trophy for the year with the most points, together with the Buxton relay trophy, while Final Year managed to retain the Tanner Tug-o'-War Trophy.

Afterwards the Acting Principal, Professor J. McCunn, expressed the appreciation of the College for

the work which the Club's President, Mr. J. C. Greatorex, incurs in organising this yearly event. Mrs. McCunn then presented the prizes.

The day's sport was concluded with a dance at the Parish hall.

MINISTRY OF AGRICULTURE

Veterinary Field Staff

The following changes have been made in the Veterinary Field Staff:—

Mr. A. M. Urquhart, M.R.C.V.S., Superintending Veterinary Officer, has been transferred from Edinburgh to Head Office, Tolworth.

Mr. R. S. Wilson, M.R.C.V.S., Veterinary Officer at Wolverhampton, retired on May 17th, 1955.

Mr. D. F. Hamilton, M.R.C.V.S., has been appointed to the permanent staff as a Veterinary Officer and will be stationed at Carlisle.

PRESIDENT R.C.V.S. ELECTED CHAIRMAN OF BIRKBECK COLLEGE

At a recent meeting of the Governors of Birkbeck College, University of London, Dr. W. R. Wooldridge was elected Chairman. He had previously been Vice-chairman of the Governors, and a member of the governing body for the past 20 years.

PIG PROGENY TESTING SCHEME

The Ministry of Agriculture and the Department of Agriculture for Scotland have announced preliminary details of the plan for establishing progeny testing stations for boars in Great Britain. The scheme provides for five stations, three in England, one in or serving Wales and one in Scotland. Each station will accommodate 400 pigs (100 litter groups of four pigs) at a time and between them the five stations will be capable of testing about 300 boars a year. It is hoped that the first station will be in operation by the spring or early summer of next year.

The Minister of Agriculture and the Secretary of State for Scotland will act as trustees for producers; they will let the stations at a nominal rent to an independent authority registered under the Companies Act. This independent authority will be run by a board of governors which will be in exclusive control of the undertaking provided they act in accordance with the memorandum and articles of association under which the company is registered.

It is intended that the board of governors should comprise representatives of the Government, commercial pig producers, pedigree breeders, the bacon curers, and probably the pork trade. The members will be appointed by the National Farmers' Union (4), the National Pig Breeders' Association (4), the Minister of Agriculture, and the Secretary of State for Scotland (4), the Bacon Marketing Board (1) and the pork trade (1). The progeny testing authority will be formally constituted within the next few months. A working party under the aegis of the Ministry is working out the preliminary practical details of the scheme.

HOLIDAY EXCHANGE

There appear to be a number of French veterinary surgeons whose sons and daughters would like to spend part of their summer holidays with British veterinary surgeons and, in return, would like to entertain the British children in their homes.

The following is a list of places where there is a French veterinary family who would like to make this exchange, and any member of the profession who is interested is asked to write as soon as possible to the General Secretary of the B.V.A. for further particulars.

Gers : 13-year-old boy.

Vienne : 16-year-old girl.

Maine-et-Loire : 14-year-old girl.

Vienne : 14-year-old boy.

Cholet (Maine-et-Loire) : 14-year-old girl would like to stay in Southampton area from mid-July.

PERSONAL

Births

BLACK.—On May 15th, 1955, to Beryl (*née* Ricketts) and A. McColl Black, M.S.R.C.V.S., of Kent House, 49, Kent Road, Southsea, a daughter, Heather.

BLYTHMAN.—On May 20th, to Elspeth, wife of W. Grant Blythman, B.SC., M.R.C.V.S., 16, Elsdon Road, Gosforth, Newcastle upon Tyne, 3, a daughter, sister for Alistair.

GOURLAY.—On May 7th, 1955, at European Hospital, Kampala, Uganda, to Doreen, wife of R. N. Gourlay, B.SC., M.R.C.V.S., a son, David Cleland.

HARRIS.—On May 16th, 1955, at Fordingbridge Cottage Hospital, to Rosemary (*née* Street), wife of Kenneth A. Harris, M.R.C.V.S., Portway, Stratford-Sub-Castle, Salisbury, a daughter (Jill McIntyre), a sister for Fiona.

HERROD-TAYLOR.—On May 15th, 1955, to Denise, wife of E. E. Herrod-Taylor, M.R.C.V.S., Guy Street, Leamington Spa, a son, Nicholas Rigby.

HORROX.—On May 15th, 1955, to Jean, wife of Michael A. Horrox, M.R.C.V.S., of 3, Martin Road, Bridlington, E. Yorks, a daughter—a sister for Nigel.

MR. D. G. DAVIES

The funeral of Mr. D. G. Davies, M.R.C.V.S., of 3, Heathfield, Swansea, took place at Oystermouth Cemetery, on Saturday, May 14th. Archdeacon J. J. A. Thomas, Vicar of Swansea, officiated at the house and the graveside. A large number of friends representing agricultural and industrial interests in the town were present.

The profession was represented by Messrs. D. E. Pugh and D. G. Morgan.

Mr. Pugh writes:—

The death of Mr. David Gladstone Davies at his home, 3, Heathfield, Swansea, marks the passing of yet another of the dwindling number of the "old school" of the profession.

A man of striking personal appearance, Gladstone, as he was affectionately known to a host of friends, was a big man in every sense of the word, a practitioner in the best tradition, extremely jealous of the good name of his profession and devastating in his views on anything savouring of the unprofessional.

Apart from service in France with the R.A.V.C. during World War I he spent the whole of his professional life at Swansea where for very many years he maintained an extensive practice, his chief interests being in the horse and in public health.

In the latter sphere he did notable pioneer work in obtaining a place for the profession in the field of meat inspection.

To Mrs. Davies we extend our sincere sympathy in her grievous loss a few weeks after celebrating her diamond wedding, and also to his son and two daughters.

R.C.V.S. EXAMINATIONS, MAY, 1955

Pharmacology—List of Successful Candidates

Dublin :—

Cooney, J. F.; Corcoran, M. P.; Denvir, K.; Doherty, P. L. (credit); Gibney, E. E.; Jones, R. F. C.; Keane, M. J.; Kelleher, J. F. L.; McCarthy, W.; McGilligan, C. A. (credit); McGovern, P. G.; McLaughlin, David; Mansfield, M. P.; Martin, W. H.; May, D. J. (credit); Moloney, P.; Mulvey, W. J. (credit); O'Neill, Alex.; Quill, T. S.; Rispin, K.; Schlesinger, Percy; Smyth, D. J. (credit); Wallace, James.

Animal Management—List of Successful Candidates

Dublin :—

Barrett, J. N. (credit); Byrne, C. J.; Collins, T. D.; Cooney, J. F. (credit); Corry, D. M.; Crowe, J. F.; Denvir, K.; Dickson, H. P.; Doherty, P. L.; Gibney, E. E.; McAuliffe, M. J.; McGilligan, C. A.; McGovern, P. G.; McIver, S. H. (credit); May, D. J.; Moloney, P.; Mulvey, W. J.; O'Brien, T. J.; O'Driscoll, T. L.; O'Reilly, C. J.; Osborne, M.; Quill, T. S.; Rispin, K.; Smyth, D. J.; Smyth, J. J.; Trouton, R. K.; Wilkie, S. D.

R.C.V.S. EXAMINATIONS

June 9th, Thursday.—D.V.S.M., Written Examinations commence at Edinburgh.

June 13th, Monday.—D.V.S.M. Oral and Practicals commence.

June 23rd, Thursday.—M.R.C.V.S. Written Examinations.

June 24th, Friday.—M.R.C.V.S. Written Examinations.

June 27th, Monday.—M.R.C.V.S., Practical and Orals commence (Panels "A" and "B").

B.V.A. COUNCIL AND COMMITTEE MEETINGS IN LONDON

Wednesday, July 6th.—

10.30 a.m. Home Appointments Committee, at 7, Mansfield Street, W.1.

12 noon Parliamentary and Public Relations Committee, at 7, Mansfield Street, W.1.

2.00 p.m. Organising Committee, at 7, Mansfield Street, W.1.

Thursday, July 7th.—

10.30 a.m. Veterinary State Medicine Committee, at 7, Mansfield Street, W.1.

2.30 p.m. General Purposes and Finance Committee, at 7, Mansfield Street, W.1.

Friday, July 8th.—

10.30 a.m. Council Meeting at the Connaught Rooms, Great Queen Street, Kingsway, W.C.2.

COMING EVENTS

June

1st (Wed.). 112th Annual General Meeting of the Royal College of Veterinary Surgeons at 10, Red Lion Square, London, W.C.1, 12 noon.

Annual General Meeting of the Victoria Veterinary Benevolent Fund, at the Royal College of Veterinary Surgeons, 10, Red Lion Square, London, W.C.1, following the A.G.M. of the Royal College of Veterinary Surgeons (called for 12 noon).

Meeting of the West of Scotland Division, B.V.A., in the Veterinary School, 83, Buccleuch Street, Glasgow, 3 p.m.

2nd (Thurs.). An evening meeting of the Lancashire Division, B.V.A. A Brains Trust at the Veterinary Hospital, Liverpool, 6.30 p.m.

3rd (Fri.). General Meeting of the South Wales Division, B.V.A., at the Cambrian Hotel, Saundersfoot, 2 p.m.

9th (Thurs.). Meeting of the Western Counties Division, B.V.A., at the Victoria Hotel, Newquay, 2.30 p.m.

Meeting of the Technical Development Committee, B.V.A., at 7, Mansfield Street, W.1, 10.30 a.m.

Annual General Meeting of the North of Scotland Division, B.V.A., in the Northern Hotel, Aberdeen, 2.30 p.m.

10th (Fri.). Annual Dinner of the R.A.V.C. Officers' Club, at Grosvenor House, Park Lane, London.

16th (Thurs.). Annual General Meeting of the Herts and Beds Division, B.V.A., at 70, Holywell Hill, St. Albans, 7.30 p.m.

23rd (Thurs.). Meeting of the Technical Development Committee, B.V.A., at 7, Mansfield Street, W.1, 10.30 a.m.

July

1st (Fri.). Ordinary General Meeting of the Society of Practising Veterinary Surgeons at the Dolwar Café, Carmarthen, 2.15 p.m.

28th (Thurs.) President's Invitation Luncheon and General Meeting of the Midland Counties Division, B.V.A., at the Swan Hotel, Stafford, 12.30 p.m.

September

4th to 10th. 73rd Annual General Meeting and Congress of the British Veterinary Association at Belfast.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Derby. Handley Wood Farm, Barrowhill, Staveley, Chesterfield; Morley House Farm, Morley (May 16).

Leics. Leicester Cattle Market, Aylestone Road, Leicester (May 14).

Norfolk. Hall Farm, Fulmodestone, Dereham (May 17).

Staffs. Rushy Pits Farm, Farley, Great Haywood (May 16).

Warwicks. Collis Farm, Stoneydelph, Wilnecote (May 13).

Yorks. Ivy House Farm, Beverley Parks, Beverley (May 14); Southgate Bungalow, Southgate, Hornsea; Top Small Shaw Farm, Thurlstone, Penistone (May 17); Rusholme Hall, Drax, Selby (May 18); North End Farm, Ottringham, Hull (May 19).

Fowl Pest

Essex. 21, The Close, Mayland, Chelmsford (May 18).

Lincs. Hobhole Bank, Old Leake, Boston (May 16); Fosters Farm, Wrangle Bank, Boston (May 17).

Swine Fever

Ayr. Cuninghame Home, Irvine (May 20).

Ches. Lynwood, Hargrave, Chester (May 17); Haughton Hall Farm, Haughton, Tarporley; Sheaf Farm, Hockenhull, Chester (May 18); Dowse Green Farm, Cholmondeley, Malpas (May 21).

Denbigh. Parks Farm, Commonwood, Holt, Wrexham (May 20).

Derby. The Cottage and Woodyard, Doveridge (May 18); Four Acres, Cowley Lane, Holmesfield (May 19).

Devon. Wood Park, Woodwater Way, Exeter (May 23).

Dorset. Manor Farm, Purse Caundle, Sherborne (May 20).

Essex. Faggs Farm, Warmongers Lane, Blackmore, Ingatestone (May 17); Hillcrest, Chapel Hill, Halstead (May 18); Mill House Farm, Harlow Common, Harlow (May 21).

Gloucs. Cherry Orchard Farm, Stretton-on-Fosse, Moreton-in-the-Marsh (May 19).

Kent. Botany Gardens, Watchester, Minster, Ramsgate (May 18); Fairbourne Manor Farm, Harrietsham (May 21).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

TWO COMPLAINTS

Sir,—*Repetition*. To those who, like myself, test anything from 200 to 400 cattle a week, and whose circumstances nevertheless are not such as to allow of the employment of a secretary, the filling in of the test charts has become a nightmare occupying two or three evenings a week and Sunday afternoons. Would it not adequately meet the case if the appropriate authority designed and introduced some such form of certificate as the following:—

" I, ..., certify that the comparative intradermal tuberculin test was applied on ....., 19....., to all bovines the property of ..... at ....., and that no animal showed a reaction of more than 2 mm., with the exception of those listed hereunder."

Catachresis. We are from time to time reminded, and rightly so, by our elders, *e.g.*, the late Dr. J. T. Edwards, or Professor McCunn, of the lucid and accurate expository prose written by our predecessors of the nineteenth and even eighteenth centuries. One supposes that, with the growth of research, it is almost inevitable that it should produce in time a jargon which, even without the graphs and histograms superimposed on it, frequently passes the comprehension of most of those outside the magic circle. The object of publishing is " to make public ": research work is of no use unless it is readily available and understandable to those to whom its findings should eventually, by their practical application, provide an increase of knowledge and power to serve. The English language is a vehicle of sufficient flexibility and power to provide the worker with a medium of self-expression without resort to coining words and phrases or the over-elaboration of existing words. Such power of expression may be seen on reading any paper by Dr. E. L. Taylor—as great a master of prose as of parasites.

Why, therefore, " centrifugalised " when " centrifuged " is enough; " a cornua " when the singular of " cornua " is " cornu," and so *ad infinitum*.

I do not anticipate, of course, that THE RECORD will become " a well of English undefiled " as a result of my plea for the right use of the language of Chaucer, Shakespeare, Milton, Macaulay and Churchill; but at least I shall have made it!

Chipping Norton, Oxon. Yours faithfully,
PAUL CROSFIELD.

May 23rd, 1955.

THE USE OF SUCCINYL-DICHOLINE CHLORIDE

Sir,—I am sincerely appreciative of Mr. L. W. Hall's objections (THE VETERINARY RECORD, March 5th, 1955) to the use of succinylcholine in unanaesthetised animals on the grounds that its injection may produce pain during the initial period of muscle depolarisation.

During this period, in experimental horses, it has been observed that there are no changes in blood

pressure; likewise, no consistent or significant changes have been noted in the pulse rate. Furthermore, we have observed no subjective signs of pain, such as vocal activity, or struggling, during the depolarisation period. It would seem, then, that this issue comes down to a comparison of (1) the validity of transferring human experience to animals, and (2) the validity of observations such as those mentioned above.

Lastly, consideration should be given to the relative merits, and demerits, of the suggested use of succinylcholine versus those of the currently employed techniques for restraining horses.

Yours faithfully,

C. M. STOWE,

Division of Veterinary Physiology and Pharmacology.
University of Minnesota,
Department of Agriculture,
University Farm, St. Paul 1.

April 21st, 1955.

REFERENCE

BELLING, J. H., & BOOTH, N. H., *Journ. A.V.M.A.* **126.** 37.

PIG OEDEMA

Sir,—In view of the correspondence of Messrs. Walther (April 9th) and Lancaster (April 23rd) relating to oedema disease, the following comment may be of interest.

A great deal has been written in THE VETERINARY RECORD concerning the possible causes of this condition since Timoney's original paper appeared after the 1950 Congress. The main facts that we can say are "established" can be summed up as follows:—

Some undefined nutritional factor is involved.

It is not an infectious condition.

The disease cannot be transmitted by feeding macerated gut from affected animals but it can be produced by the intravenous injection of a filtrate of such material.

Oedema is not a constant feature but ataxia is.

The majority of cases occur in the young pig.

To this we might add that the disease appeared more often during the period when feeding-stuffs were rationed. If this is true then the implications could be highly significant. Under rationing,, sow and weaner rations rarely contained more than 25 per cent. wheat offals whilst at present the same type of food generally contains considerably more than this amount. Of the wheat offals, bran in particular is both laxative and moderately rich in vitamin B_1. Oedema disease is essentially one of constipation. It is also interesting to note that some time ago Shanks advocated the use of bran as a preventative measure, and that in this particular area we have been fairly free of the disease, mainly due to the amount of whey used, which is, of course, laxative. I am, therefore, of the opinion that any type of feeding which will induce bowel inactivity will also predispose to oedema disease.

There is also some evidence to suggest that some degree of avitaminosis B_1 is necessary before the pig will become fully susceptible to the development of the disease. Swift has drawn an interesting comparison between beriberi in man and oedema disease of swine. Austvoll and Forrest write of the therapeutic value of the parenteral administration of this vitamin. It is said, too, that complete avitaminosis B_1 will produce nervous symptoms in the pig. The importance of this vitamin can be more fully realised if we consider that it is particularly necessary for the young pig and that its function, apart from increasing resistance to disease, is to help in the utilisation of carbohydrate. The younger the pig and the more carbohydrate fed, the greater the need for vitamin B_1. When wheat feed was in short supply extra carbohydrate was fed thereby inducing a *relative* B_1 deficiency.

It therefore seems extremely likely that before a pig will become sensitive to the disease two predisposing factors would be necessary: a relative deficiency of B_1 intake, and some general diet that will produce constipation.

There would also seem to be evidence to suggest that a third factor is involved about which there has been very varied speculation.

Virus infection. Although the case for a virus is strong one cannot readily think of any other virus that does not leave marked signs of febrile attack.

Reformed toxins or any phylactic factors in the food. Although these factors may provide the answer I personally think that it is stretching the arm of coincidence rather far to expect the factor to be present in such a wide variety of foods.

Coliform infection. The strongest case can, I think, be put for this group of organisms. They have a liking for the young animal; they are very commonly found wherever you have pigs; and they manifest themselves in very many different ways. Luke & Gordon have reported oedema associated with salmonella infection (1950).

Claims have been made for the use of *B. coli* serum and Mr. Lancaster, in his letter of the 23rd, reports success with a *B. coli* vaccine. I should be interested to learn the source of this vaccine.

I can myself quote three examples. In each case I was treating batches of pigs with sulphamezathine and in each case the disease was clinically and *post mortem* a picture of acute septicaemia. The last pig to die in each of two cases was submitted to two different laboratories for examination and in each case the report was of oedema disease.

One can try to summarise the possible aetiology of oedema disease in the following way. Certain diets will induce bowel inactivity and a relative avitaminosis B_1. Environmental changes in the bowel may either cause symbiotic coliforms to liberate an endotoxin or reduce the resistance of the gut tissues to the action of otherwise harmless enterotoxins. Although this theorising may be carrying the argument too far it would be interesting to hear the results of experimental work along these lines.

Oedema disease is but one of many conditions that illustrate the high degree of susceptibility of swine to nutrition and to a lesser degree environment. A full understanding of pig nutrition can remove the mystery from many vague illnesses and unaccountable deaths, and appropriate action can avoid further loss. There is no doubt that the misuse of pig foods is common and the manufactured product is not always beyond reproach. The collection of data on this sub-

ject by practitioners would no doubt prove instructive.

In conclusion I should like to re-emphasise the probability that a high percentage of cases of oedema disease will have occurred where the wheat feed proportion has dropped to, or below, 25 per cent. This is often the case when pigs are changed from a sow and weaner ration to a fattener ration before the pig has reached 16 weeks of age. It is frequently the case when swill, potatoes or dredge are fed with meal at the farmer's discretion. However, one must attempt to avoid generalisations with reference to the pig as it is an animal where exceptions are not found to be exceptional. Causative factors are certainly numerous and a few illustrations will show the type of conditions involved.

Quality of fibre. Coarse or unsuitable fibre may be fed or the animal may have access to coarse grass. Factors of this kind could account for cases where so-called " ideal " manufactured rations are fed.

Change of hardness in the water.

Change of wet to dry feed.

Removal of some non-fibrous laxative ingredient from the food.

It is usually assumed that constipation is a symptom of oedema disease; I think that it is far more likely that it is a precipitating factor.

Yours faithfully,
PAUL R. GREENOUGH,

Castle Cary,
Somerset.
May 16th, 1955.

References

AUSTVOLL, J. (1952). *Vet. Rec.* **64.** 136.
FORREST, W. B. (1952). *Ibid.* **64.** 104.
LUKE, D., & GORDON, W. A. M. (1950). *Ibid.* **62.** 179.
SHANKS, P. L. (1950). *Ibid.* **62.** 743.
SWIFT, R. J. A. (1952). *Ibid.* **64.** 74.

THE TSETSE PROBLEM IN SOUTHERN RHODESIA

Sir,—As one who for over 50 years has studied the tsetse problem in Southern Rhodesia (*vide* references below) I have read with grave concern the article under the above heading appearing in your issue of March 5th, 1955, which, in my opinion, is most misleading. Knowing the facts, the article appears to me to be an apologia for the entomologists who, for the past 40 years, have sought in vain to control the tsetse fly by various foolish and extravagant methods including the brutal destruction by armed natives under inadequate European control, of over half a million wild animals—to say nothing of a greater number wounded and left to die in agony.

Having for so many years been associated with the trypanosome problem in Southern Rhodesia, first as Director of Veterinary Research and later as Beit Research Worker in trypanosomiasis, I fear that I may be held responsible for, or associated with, this horrible cruelty. This is not so; I have at all times and in all places strenuously opposed it. It is to the entomologists that the blame for the present appalling state of affairs must be assigned. Strange to relate, succeeding governments of Southern Rhodesia have always " backed " the entomologist and have spent millions of pounds of public money upon their theories. In spite of public protest the present government has recently decided that the brutal slaughter of animals must be continued.

If one reads the Annual Reports of the Directors of Veterinary Services in Southern Rhodesia for the years 1952-3-4 and, indeed, the review recently published by the Trypanosomiasis Committee itself, it will be found that this slaughter policy has proved a disastrous failure. Trypanosomiasis is more prevalent in Southern Rhodesia, and the mortality is much greater than it has ever been. Moreover, the attempts to cure or arrest it by modern drugs have lamentably failed. Even the Director himself describes the deaths as " catastrophic."

It may be explained that this slaughter of game is based upon the fact that the tsetse fly is essentially a blood feeder and requires a feed of blood—and blood only—every second or third day. It is believed by certain entomologists, by no means all, that the blood of the larger game animals is essential. In entomological jargon they are said to be more " dependable." But anybody who has had any practical experience knows that in the absence of the larger animals the tsetse fly (*G. morsitans*) will feed upon the smaller animals which cannot be exterminated or driven away. They will even feed upon human beings and their domestic stock, or on baboons, of which there are hundreds of thousands in the fly-infested areas. Dr. Alan Mackenzie—who first saw *T. rhodesiense* in Southern Rhodesia—used to carry in his wallet a photograph of a baboon covered with specks which on magnification proved to be tsetse flies. He, although a keen hunter, was averse to the ruthless slaughter of game. More than one stockman has said " My cattle were all right until these silly —— started driving the game about." And facts speak for themselves. By driving the game here, there and everywhere, carrying the fly with them, trypanosomiasis has been widely disseminated and is to-day causing appalling mortality in areas where hitherto it was not known to exist. This is not imagination or misrepresentation. It is confirmed by official reports.

The article in your issue of March 5th is not correct when it says " there is no alternative to the policy of game destruction." There is, but some little further research is necessary to make it applicable to local conditions. But the Trypanosomiasis Committee is averse to any alternative, and we are credibly informed that at a recent Press conference they strenuously opposed research. A member of our profession is reported to have stated that further research was unjustified because all the research necessary was being performed in other territories. He surely is aware of the fact that there are various strains of trypanosomes each with its own pathogenicity and drug affinities which must be investigated " on the spot," that is, in its own natural environment. Let us take, for example, the drug Surfen-C, which was at one time said to be effective against the congolense-like trypanosome in Egypt, the Gold Coast, Nigeria and Nyasaland, but was quite ineffective against the similar organism in S. Rhodesia and the Union of South Africa. Or dimidium bromide,

said to be so effective in N. Rhodesia but so " catastrophic " in S. Rhodesia. In my opinion the answer to the trypanosomiasis problem lies in research, that is, intensive and continuous research by persons qualified and competent to perform it.

Incidentally they should not be civil servants, already overwhelmed with their other multifarious duties, with one eye on the Treasury and the other on the clock, who carry out the research dictated by the ministerial head of their department who, although an astute politician, may have had no scientific education.

Your readers may not appreciate the importance of this controversy. The article in your issue of March 5th admits that " some 16,000 square miles of the colony (S. Rhodesia) are still infested." A far greater area is threatened, and under existing conditions the infestation cannot be arrested. The mortality in S. Rhodesia was never so great. N. Rhodesia and Nyasaland are also infested. In these latter the deadly *Trypanosoma rhodesiense* infection occurs; and it is said that 4,000,000 square miles of territory adjoining these areas is infested with 20 species of tsetse fly each, no doubt, transmitting its own special disease to man and animals and presenting its own specific drug affinities.

As a member of the veterinary profession and as an old Rhodesian, I feel it my duty to draw attention to the fallacies which are being disseminated concerning this all-important problem which threatens the beneficial progress and development of the Federated States of Rhodesia and Nyasaland and, indeed, the vast area which politicians fondly visualise as the British Dominion of Central Africa.

Yours faithfully,

L. E. W. BEVAN,

22, Camp Road,
Pinelands,
Cape Town.

May 2nd, 1955.

References

BEVAN, L. E. W. (1909). The Tsetse Fly. *Rhodesia Agric. J.* and Official Bulletin 12.

———. (1910). Notes on Trypanosomes of Dimorphon Group. *Ra. Agr. J.* June.

———. (1910). Note on the Passage of a Human Trypanosome through Domestic Animals. *J. Comp. Path. & Ther.* **23** (2). 160 *et seq.*

———. (1910). Notes on a Human Trypanosome Transferable to Animals. *Vet. J.* **18.** 41.

———. (1912). Notes on a Strain of Human Trypanosome and a Review of the Present Knowledge of the Human Trypanosomes of Northern Rhodesia and Nyasaland. *J. Comp. Path. & Ther.* **25.** 298 *et seq.*

———. (1925). The Trypanosomes of Man and Animals in Southern Rhodesia. *Vet. J.* **81.** 636.

———. (1926). The Influence of Dipping in Solutions of Arsenic upon the Course of Trypanosomiasis. *J. Comp. Path. & Ther.* **29.** 284.

———. (1927). A New Method of Feeding Blood-sucking Flies. *Trans. R. Soc. Trop. Med. Hyg.* **21** (3). 219.

———. (1928). A Method of Inoculating Cattle against Trypanosomiasis. *Ibid.* **22.** 147.

———. (1936). Notes of Immunity in Trypanosomiasis. *Ibid.* **30.** 199–206.

———. (1936). Notes on the Treatment and Prevention of Trypanosomiasis. *Vet. J.* **93.** 388–395.

———. (1940). The Chemoprophylaxis of Trypanosomiasis. *Vet. Rec.* **52.** 257.

THE TRYPANOSOMIASIS COMMITTEE OF SOUTHERN RHODESIA. (1945). The Scientific Basis of the Control of *Glossina morsitans* by Game Destruction. *Ra. Agr. J.* **42.** and Bulletin 1303.

———. (1955). A Review of Tsetse and Trypanosomiasis in Southern Rhodesia.

A CLINICAL CURIOSITY

Sir,—The interesting letter by Mr. Wilkinson prompts me to report the following case seen last week. The subject was a 12-year-old queen believed to be passed full term pregnancy by three or four days. There was no sign of labour, the abdominal wall was completely flaccid, and two hard irregular objects could be palpated through it.

Laparotomy was performed and it was discovered that there was strangulation of the cervical part of the uterus by the left ovarian ligament, the left uterine horn being completely circular in shape and containing a dead mature foetus. The right horn was apparently absent altogether.

The objects in the abdominal cavity were two mummified foetuses each covered in a separate and very thin membrane. Development was arrested at about mid term.

Ovaro-hysterectomy was performed in a typical manner, but the cat died 24 hours after the operation. It seemed reasonable to suppose that rupture of the right uterine horn had occurred at about mid term allowing the foetuses to pass into the abdominal cavity causing their death, complete involution of the right horn predisposing in some way to the subsequent strangulation.

Yours faithfully,

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56 Stonegate Road,
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May 21st, 1955.

Under the title Dermatomycoses of Dogs and Cats a letter from Mr. R. B. Griffiths was published on May 14th. This letter should have been withdrawn in favour of that previously published by the same writer, and was printed inadvertently.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-mouth	Fowl Pest	Sheep Scab	Swine Fever
16th to 30th April, 1955		38	—	—	15	—	74
Corresponding period in	1954	18	—	1	24	—	88
	1953	24	—	1	18	—	238
	1952	39	—	43	8	—	49
1st January to 30th April, 1955		349	—	6	209	—	484
Corresponding period in	1954	106	—	12	469	—	484
	1953	350	—	25	210	—	1,018
	1952	174	—	115	100	1	398